CLAIMS

What is claimed is:

1. An acid end-capped inherently electrostatic dissipating block copolymer (acid end-capped IDP) composition comprising:

(A) from about 95 to about 99.99 weight percent of an inherently electrostatic dissipating block copolymer (IDP) comprised of:

(i) from about 5 to about 85 weight percent of a soft segment of a polyalkylene glycol

and

(ii) from about 15 to about 95 weight percent of a hard segment, wherein the hard segment is derived from a polymer having a glass transition temperature or crystalline melting temperature greater than ambient temperature and being reactive with a hydroxyl functionality,

wherein the weight percents of the soft segment and the hard segment are based on the total weight of components (i) and (ii);

and

(B) from about 0.01 to about 5 weight percent of an acid end-capping reagent having at an acid functionality of at least two;

wherein the weight percents of the IDP and the acid end-capping reagent are based on the total weight of components (A) and (B), and wherein after formation of the IDP, the IDP is subsequently modified with the acid end-capping reagent to form the acid end-capped IDP composition.

2. The acid end-capped IDP composition of claim 1 wherein the IDP is present from about 95 to about 99.9 weight percent and the acid end-capping reagent is present from about 0.1 to about 5 weight percent.

3. The acid end-capped IDP composition of claim 1 wherein the IDP is present from about 97 to about 99.7 weight percent and the acid end-capping reagent is present from about 0.3 to about 3 weight percent.

4. The acid end-capped IDP composition of claim 1 wherein the IDP is selected from the group consisting of a polyetherester, a polyetherurethane, and a polyetheresteramide.

5. The acid end-capped IDP composition of claim 1 wherein the soft segment is present from about 30 to about 65 weight percent and the hard segment is present from about 35 to about 70 weight percent.

6. The acid end-capped IDP composition of claim 1 wherein the polyalkylene glycol is selected from the group consisting of polyethylene glycol, polypropylene glycol, polytetramethylene glycol, and polybutylene glycol or copolymers.

7. The acid end-capped IDP composition of claim 6 wherein the polyalkylene glycol is polyethylene glycol having a molecular weight range of from about 900 to about 8000 grams per mole.

8. The acid end-capped IDP composition of claim 7 wherein the polyalkylene glycol is polyethylene glycol having a molecular weight range of from about 1000 to about 3400 grams per mole.

9. The acid end-capped IDP composition of claim 8 wherein polyethylene glycol has a molecular weight of about 2000 grams per mole.

10. The acid end-capped IDP composition of claim 1 wherein the polymer of the hard segment is a polyester.

11. The acid end-capped IDP composition of claim 1 wherein the polymer of the hard segment is a polyurethane.

12. The acid end-capped IDP composition of claim 1 wherein the polymer of the hard segment is a polyamide.

13. The acid end-capped IDP composition of claim 1 wherein the polymer of the hard segment is a polycarbonate.

14. The acid end-capped IDP composition of claim 1 wherein the acid end-capping reagent is selected from the group consisting of a cyclic anhydride, a multifunctional acid, an ester of a multifunctional acid, a multifunctional acid chloride, and an ester of a multifunctional acid chloride.

15. The acid end-capped IDP composition of claim 14 wherein the acid end-capping reagent is a cyclic anhydride.

16. The acid end-capped IDP composition of claim 14 wherein the acid end-capping reagent is a diacid.

17. The acid end-capped IDP composition of claim 14 wherein the acid end-capping reagent is selected from the group consisting of phthalic anhydride, terephthalic acid, isophthalic acid and adipic acid.

18. An alloy comprising the acid end-capped IDP composition of claim 1 and a thermoplastic base material.

19. The alloy of claim 18 wherein the acid end-capped IDP composition is present from about 10 to about 50 weight percent and the thermoplastic base material is present from about 50 to about 90 weight percent.

20. The alloy of claim 19 wherein the acid end-capped IDP composition is present from about 25 to about 35 weight percent and the thermoplastic base material is present from about 65 to about 75 weight percent.

21. The alloy of claim 18 wherein the thermoplastic base material is selected from the group consisting of polyvinyl chloride; copolymers of polyvinyl chloride; chlorinated polyvinyl chloride; copolymers of styrene and acrylonitrile; terpolymers of styrene, acrylonitrile, and diene rubber; copolymers of styrene and acrylonitrile modified with an acrylate elastomer; copolymers of styrene and acrylonitrile modified with ethylene propylene diene monomer rubber; polystyrenes; rubber modified impact polystyrenes; polyamides; polycarbonates; polyesters; polyetherester block copolymers; polyetheramide block copolymers; polyetherurethane block copolymers; polyurethanes; polyphenylene oxide; polyacetals; cellulosics; acrylics; and polyolefins.

22. The alloy of claim 21 wherein the polyester is selected from a polybutylene terephthalate, a polyethylene terephthalate, and a polyethylene-co-1,4-cyclohexylene terephthalate.

23. A process for preparing an acid end-capped IDP composition comprising the steps of:

(A) forming in a reactor an inherently electrostatic dissipating block copolymer (IDP) comprised of (i) from about 5 to about 85 weight percent of a soft segment of a polyalkylene glycol and (ii) from about 15 to about 95 weight percent of a hard segment, wherein the hard segment is derived from a polymer having a glass transition temperature or crystalline melting temperature greater than ambient temperature and being reactive with a hydroxyl functionality and

wherein the weight percents of the soft segment and the hard segment are based on the total weight of components (i) and (ii);

(B) then, adding in the reactor from about 0.01 to about 5 weight percent of an acid end-capping reagent having an acid functionality of at least two to the reaction product of step (A) to form an acid end-capped IDP composition, the weight percent of the acid end-capping reagent is based on the total weight of the reaction product of step (A) and the acid end-capping reagent; and

(C) removing from the reactor an acid end-capped IDP composition.

24. The process of claim 23 wherein step (B) the acid end-capping reagent is added from about 0.1 to about 5 weight percent.

25. The process of claim 23 wherein step (B) the acid end-capping reagent is added from about 0.3 to about 3 weight percent.

26. The process of claim 23 further comprising between step (B) and step (C), the step of removing unreacted acid end-capping reagent from the reactor.

27. The process of claim 23 wherein the IDP is a polyetherester and wherein step (A) the IDP is formed by the steps comprised of:

(1) reacting a first glycol, a polyalkylene glycol and a diacid or a diester of a diacid at sufficient temperatures and pressures to effect esterification or transesterification; and

(2) then, polycondensing the product of step (1) at sufficient temperatures and pressures to form an inherently electrostatic dissipating block copolymer (IDP) having a polyetherester composition and an inherent viscosity of from about 0.4 to about 1.4 dL/g.

28. The process of claim 23 wherein the IDP is a polyetherurethane and wherein step (A) the IDP is formed by reacting the polyalkylene glycol, a non-hindered diisocyanate, and an aliphatic extender glycol at sufficient temperatures and pressures to effect polymerization.

29. The process of claim 23 wherein the IDP is a polyetheresteramide and wherein step (A) the IDP is formed by reacting the polyalkylene glycol with a dicarboxylic polyamide at sufficient temperatures and pressures to effect polymerization.

30. A process for preparing an acid end-capped IDP composition comprising the step of combining in a secondary melt phase operation from about 95 to about 99.99 weight percent of an IDP and from about 0.01 to about 5 weight percent of an acid end-capping reagent having an acid functionality of at least two to form an acid end-capped IDP composition;

wherein the secondary melt phase operation is conducted at a temperature above the melting point of the IDP;

wherein the IDP is comprised of from about 5 to about 85 weight percent of a soft segment of a polyalkylene glycol and from about 15 to about 95 weight percent of a hard segment derived from a polymer having a glass transition temperature or crystalline melting temperature greater than ambient temperature and being reactive with a hydroxyl functionality; and

wherein the weight percents for the IDP and acid end-capping reagent are based on the total weight of the acid end-capped IDP composition and the weight percents for the soft segment and the hard segment are based on the total weight of the IDP.

31. The process of claim 30 wherein the acid end-capping reagent is combined in the secondary melt phase operation from about 0.1 to about 5 weight percent.

32. The process of claim 30 wherein the acid end-capping reagent is combined in the secondary melt phase operation from about 0.3 to about 3 weight percent.

33. The process of claim 30 wherein the secondary melt phase operation is conducted in a twin screw extruder.

34. The process of claim 30 further comprising the step of removing unreacted acid end-capping reagent from the secondary melt phase operation.

35. The process of claim 31 wherein the removing of unreacted acid end-capping reagent is through a devolatilization zone.

36. A process for preparing an alloy of an acid end-capped IDP composition and a thermoplastic base material comprising the step of blending in a melt processing operation an inherently electrostatic dissipating block copolymer (IDP), an acid end-capping reagent having an acid functionality of at least two and a thermoplastic base material;

wherein the IDP is comprised of (i) from about 5 to about 85 weight percent of a soft segment of a polyalkylene glycol and (ii) from about 15 to about 95 weight percent of a hard segment, wherein the hard segment is derived from a polymer having a glass transition temperature or crystalline melting temperature greater than ambient temperature and being reactive with a hydroxyl functionality and wherein the weight percents of the soft segment and the hard segment are based on the total weight of components (i) and (ii);

wherein the amount of acid end-capping reagent is added at from about 0.01 to about 5 weight percent based on the weight of the IDP and acid end-capping reagent; and

wherein the amount of thermoplastic base material is added at from about 50 to about 90 weight percent based on the weight of the acid end-capped IDP and thermoplastic material.

37. A process for preparing an alloy of an acid end-capped IDP composition and a thermoplastic base material comprising the step of combining in a secondary melt phase operation from about 97.5 to about 99.999 weight percent of an IDP/thermoplastic alloy and from about 0.001 to about 2.5 weight percent of an acid end-capping reagent having an acid functionality of at least two to form an alloy of an acid end-capped IDP composition and a thermoplastic base material;

wherein the secondary melt phase operation is conducted at a temperature above the melting point of the IDP;

wherein the IDP/thermoplastic alloy is comprised of from about 10 to about 50 weight percent of an IDP and from about 90 to about 50 weight percent of a thermoplastic material;

wherein the IDP is comprised of from about 5 to about 85 weight percent of a soft segment of a polyalkylene glycol and from about 15 to about 95 weight percent of a hard segment derived from a polymer having a glass transition temperature or crystalline melting temperature greater than ambient temperature and being reactive with a hydroxyl functionality; and

wherein the weight percents for the IDP/thermoplastic alloy and the acid end-capping reagent are based on the total weight of the alloy of the acid end-capped IDP composition and the thermoplastic base material, the weight percents for the IDP and thermoplastic material are based on the total weight of the IDP/thermoplastic alloy and the weight percents for the

soft segment and the hard segment are based on the total weight of the IDP.

38. The process of claim 37 wherein the acid end-capping reagent is combined in the secondary melt phase operation from about 0.1 to about 2.5 weight percent.

39. The process of claim 37 wherein the acid end-capping reagent is combined in the secondary melt phase operation from about 0.03 to about 1.5 weight percent.

40. The process of claim 37 wherein the secondary melt phase operation is conducted in a twin screw extruder.

41. The process of claim 37 further comprising between step (B) and step (C), the step of removing unreacted acid end-capping reagent from the reactor.

42. The process of claim 41 wherein the removing of unreacted acid end-capping reagent is through devolatilization zone.